



ADDIS ABABA UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS
SCHOOL OF COMMERCE
PROJECT MANAGEMENT PROGRAM

**AN ASSESSMENT OF THE CAUSES OF COST OVERRUN AND
SCHEDULE DELAY ON AN IT PROJECT: THE CASE OF NBE
APPLICATION VIRTUALIZATION PROJECT**

BY

ENAS MOHAMMED

JUNE, 2017

ADDIS ABABA, ETHIOPIA

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**A PROJECT WORK SUBMITTED TO ADDIS ABABA UNIVERSITY SCHOOL
OF COMMERCE GRADUATE STUDIES PROGRAM IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR OBTAINING MASTERS OF
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ADVISOR

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JUNE, 2017

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DECLARATION

I hereby declare that the study entitled “*An Assessment of the Causes of Cost Overrun and Schedule Delay on an IT Project: The Case of NBE Application Virtualization Project*” is the results of my research and is my original work except for the literature which sources have clearly been stated and duly acknowledged. I have conducted the study independently with the guidance and comments of my research advisor. This study has not been presented for any degree in this university or any other.

By- Enas Mohammed

Signature

Date

LETTER OF CERTIFICATION

This is to certify that Enas Mohammed has carried out this research work on the topic entitled “*An Assessment of the Causes of Cost Overrun and Schedule Delay on an IT Project: The Case of NBE Application Virtualization Project*” under my supervision. This work is original in nature and suitable for submission in partial fulfillment of the requirement for the award of Master of Arts Degree in Project Management.

Advisor- Temesgen Belayneh (PhD)

Signature

Date

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Acronym

NBE- National Bank of Ethiopia

INSA- Information Network Security Agency

USI-United System Integrators

IT- Information Technology

ISMD- Information Systems Management Directorate

CIC- Credit Information System

EATS- Ethiopian Automatic Transfer System

VPN- Virtual Private Network

MOFED- Ministry of Finance and Economic Development

ERCA- Ethiopian Revenues and Customs Authority

SPSS- Statistical Package for the Social Sciences

Abstract

The purpose of this study is to assess the causes of cost overruns and schedule delay on an IT project with particular emphasis to the Application Virtualization Project at NBE as it has encountered a staggering 148% cost overrun and 242% schedule delay. To address the two major issues of cost overrun and schedule delay, a case study research design was employed. The research used a mixed approach as both qualitative and quantitative data were collected and analyzed. Both primary and secondary source of data were used. Both close ended and open ended questions were included on the questionnaire while the interview was unstructured, these two were used as a primary source of data. Different texts, articles, journals and dissertations were used as a secondary source of data. The sampling technique that was applied for this study was a non-probability sampling technique, in particular purposive sampling. The sample size identified using the purposive sampling was 15, from whom data was gathered by distributing questionnaires. All 15 were filled and collected, in addition to the questionnaire 3 people were interviewed, the project manager and other 2 top level managers who are members of the steering committee. The data obtained through questionnaire has been analyzed quantitatively using descriptive statistics namely frequency and percentages through SPSS version 20. In addition, the data obtained using interviews has been analyzed qualitatively. The findings of research are that the major causes of schedule delay include poor schedule management, project complexity, additional work, scope change, design related mistakes and delayed decision making process, while the major causes of cost overrun are poor cost management, complexity of the project, new technology being involved, change in project scope, additional work and rework, incomplete requirements and design. In addition, the overall project management practice of the bank has been found to be ineffective and inadequate. As a result, some recommendations have been delivered under this study on what actions should be taken to tackle the two major problems of cost overrun and schedule delay.

Key words: Cost overrun, Schedule delay, IT projects

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

For virtually every project, the goal can be conceptualized in terms of hitting a target that floats in the three dimensions of cost, time, and performance. Cost is the specified or budgeted cost for the project. Time is the scheduled period over which the work is to be done. Performance is what the project end-item, deliverables, or final result must do; it includes whatever the project customer or end-user considers necessary or important. The target represents a goal to deliver a certain something, by a certain date, for a certain cost. The purpose of project management is to hit that target. However, due to different reasons like technological complexity, changing markets, and an uncontrollable environment it's easy to miss the target (Nicholas & Steyn, 2012)

Project success is usually defined as meeting the project goals and objectives as prescribed in the project plan. A successful project means that the project has accomplished its technical performance, maintained its schedule, and remained within budgetary costs (Frimponga, Oluwoyeb, & Crawfordc, 2003).

Although the aim of a project manager is to achieve success in all the different aspects of the project, the manager of a typical project would consider the task well done if the project is finished on time, according to its specified performance and within its budgeted cost. These three objectives; time, performance and cost are traditionally the basic parameters for measuring project success or failure (Lock, 2007).

Though the above scholars strongly agree that the success of a project is defined in terms of the completion of the project in the predetermined time, cost and performance requirements some scholars like Frame (2002) argue that this is not necessary the right definition of a successful project. According to him project success is determined based on the client satisfaction it delivers, not solely on the delivery of the projects in the context of three constraints. This means despite the fact that a project may be behind schedule and over budget, a project may be deemed successful if the requirements set by the project stakeholders are met. According to this scholar projects that are over budget and behind schedule can be regarded as successful if they meet the

client specification as indicated in the plan or if they accommodate any change requests appeals made by the stakeholders.

Another scholar Kerzner (2009), indicated that the traditional definition of project success used for the past twenty years has been modified to include completion of the project at the proper performance or specification level, with acceptance by the customer/user, with minimum or mutually agreed upon scope changes, without disturbing the main work flow of the organization, without changing the corporate culture the previous section. This implies that a project that has been completed within the specified date and budget may be deemed as a failed project if the end result/ deliverable cannot be used by the clients. This means that the traditional definition of project success is going through a rapid adjustment.

According to Roberts & Wallace (2004), the three variables time, cost, and quality are interrelated and a change in any single variable frequently has a significant impact on the others. This means in trying to meet schedule and quality requirements, costs increase. Conversely, in trying to contain costs, quality of the work done erodes and schedules slip. If we try to deliver the project under the minimum time then we have to endure additional cost and maybe tradeoff the quality of the deliverables. This indicates that a project cannot be completed according to the initially planned budget and schedule without making any tradeoffs.

In recent times, it is extremely rare that a project is completed within its set budget. Proper planning is the key to a successful project, but there are few problems that are usually beyond the realm of planning. One of them is the budget overrun. It's true that we can avoid certain problems through planning and proper execution but it can never predict exactly what would happen once we start a project, as we execute the project proper adjustments and tradeoffs need to be made to the budget and schedule to deliver the project to the client (Noorani, 2016).

Delay and cost overrun are inherent part of most projects despite the much acquired knowledge in project management. It is therefore much appreciated to look at some reasons of delays and cost overrun in project and their mitigation process, so as to increase the perception of project success (Buys, 2015).

1.2 Statement of the Problem

An IT system is an essential part of any organization these days due to the complex and dynamic nature of the world. Technology related projects are everywhere and their success determines the success of the company and maybe even its very existence. On average IT projects may face a cost overrun by 45% and can be 7% behind the planned schedule, these problems are more severe in software development projects. (Bloch, Blumberg, & Laartz, 2012)

As cited by Lewis (2007), the Standish Group has found that only about 17 percent of all software projects undertaken meet the original time and cost targets, 50 percent have the targets changed; meaning they are usually late, overspent, and have performance requirements reduced or changed and the remaining 33 percent are actually canceled. In 2015 the Standish Group defined failed projects as projects that were either canceled prior to completion or not used after implementation.

In the study conducted by Ameh, Soyingbe, & Odusami (2010), the research focused on examining significant factors that cause cost overruns in the development of telecommunication projects in Nigeria. The study focused on the infrastructural aspects of the industry and identified five major categories as the cause for the cost overrun. As cited by Al Zadjail, Bashir & Maqrashi (2014), the study by the above authors is possibly the only study that focused specifically on identifying the reasons for cost overrun in telecommunications projects.

Based on a preliminary interview conducted with a senior systems admin and the project manager at NBE the researcher was able to identify that the application virtualization project has faced a 242% schedule delay and a 148% cost overrun. The project manager indicated that the project is still in progress and that it's not yet finished which implies that the problem of cost overrun and schedule delay will continue till the end of the project. Due to this problem in the application virtualization project at NBE and the gaps from the conducted researches on this area, the researcher was attracted to conduct a critical study on the project cost overrun and schedule delay at NBE on the selected project.

1.3 Research Question

- What is the cost and time management practice in NBE Application Virtualization Project?
- What are the sources of cost overrun in NBE Application Virtualization Project?
- What are the reasons for schedule slippage in NBE Application Virtualization Project?

1.4 Research Objective

1.4.1 General Research Objective

The major objective of this study was to assess the causes of cost overrun and schedule delay with particular reference to application virtualization project which has encountered these problems.

1.4.2 Specific Research Objectives

- To identify and asses the cost and time management practice in NBE Application Virtualization Project.
- To identify and asses the reasons for cost overrun in NBE Application Virtualization Project.
- To identify and asses the reasons for schedule delay in NBE Application Virtualization Project.

1.5 Scope of the Study

This research covered the causes of cost overrun and schedule delay at NBE application virtualization project. Though NBE has different projects and programs in its different departments, this study focused only on the projects in the IT department. In addition, the study gives particular emphasis to the application virtualization project which has faced the problems of cost overrun and schedule slippage.

1.6 Limitation of the Study

Since the study required conducting an interview with different senior managers, the demanding nature of their work forced them to avoid and not engage in the study. In addition, since the topic is highly sensitive the researcher was not able to get a hold of the project plan and other cost and schedule related documents as it was labeled confidential and classified.

1.7 Significance of the Study

The study intended to assist in revealing the factors that cause cost overrun and schedule slippage in the application virtualization project undertaken at NBE. This study planned to provide implementable solution for the problems that have been stated above; hence it can be used as a guide to tackle the problems faced by the organization. In addition it can be used as a reference for further measures if they are to be taken by other organizations to address similar or related problem. The study is also important to the researcher as it add theoretical and practical knowledge on how to conduct research. The study will also be significant to scholars and researchers in other higher learning institutions who require basis for further research in this area.

1.8 Organization of the Study

This study was organized into five main chapters. The first chapter is the introduction which includes the background to the study, problem statement, research questions, research objectives, scope and limitation of the study, significance and organization of the study. Chapter two discusses the relevant literature from the perspectives of scholars in this area of study. Chapter three constitutes of the methodology employed in the study. It includes the research design, source of data, sample and sampling technique, data collection techniques, data analysis. The fourth chapter of this work includes analysis, presentations and interpretations of collected data. The final chapter, chapter five provides summary of major findings, the conclusion of the study and suggests possible remedial recommendations.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 Introduction

There is overwhelming evidence that large IT projects indeed tend to fail. IT projects seem to fail in both private and public sectors, however failure in public IT projects appear to be more spectacular due to size, visibility in media and political consequences. There is a pressing need for governments to avoid gigantic IT project failures. Consequently, there is a need for research to better understand why some public projects fail and other succeed (Holgeid &Thompson, 2013)

The Standish Group defines success as follows and differentiates failure in to the following categories as presented in CHAOS (1994):

- Successful project: These projects are completed on time and on budget, with all features and functions as initially specified. Only 16.2% of projects fell in this category
- Challenged project: These projects are completed and operational but are over-budget, over the time estimate, and offer fewer features and functions than originally specified. 52.7% of all studied projects fell into the challenged category.
- Impaired/ Failed project: These projects are cancelled at some point during the development cycle. They are abandoned at some point and thus became total losses. A disturbing 31.1% of all studied projects fell into this category.

Thus it should be noted that for the purposes of this study the above three Standish Group measures of project outcome will be used. A successful project must be on time, on budget, and deliver quality (features and functions) as promised. Anything less will be either a failed project or a challenged project.

2.2 Project Cost/Budget

Before starting any project we first need to ask how much the project is going to cost and how accurate the estimate is, both of which affect the outcome of any project. A realistic cost estimate is an important and significant factor for project success. If a project is launched without having an accurate estimate it's bound to experience serious problems during the implementation phase. Having a budget is also an essential requirement of any projects, we need to aggregate the figures to produce a cost baseline and determine the projects' funding requirements (FME, 2014)

A budget is a clear picture of financial resources available to complete the project. No matter what type of organization and what type of projects we have, there will be a predetermined budget. When one undertakes different projects there is usually a delineated budget with in which one should complete the work of the project (Benator &Thumann, 2003).

The budget also serves as a standard for comparison, a baseline from which to measure the difference between the actual and planned uses of resources. When the project is being implemented the project manager can use the budget as a means of effective monitoring. This allows deviations from planned usage to be checked against the progress of the project, and reports can be generated if expenditures are not consistent with the project accomplishments. Indeed, the pattern of deviation or variances can be examined to see if it is possible or reasonable, to forecast any significant departures from budget and hopefully take corrective actions (Meredith & Mantel 2009).

Determining the cost of a project requires a structured approach, but whichever method is used, the first thing is to decide the level of accuracy required, which depends on the status of the project and the information available. In many cases a client or sponsor requires only an approximate figure before deciding whether to proceed to the next stage. An estimate in such a situation does not have to be as accurate as an estimate for the final contract cost to which one is then committed. Estimating is an essential part of project management, since it becomes the baseline for subsequent cost control. If the estimate for a project is too low, a company may well lose (Lester, 2003)

The person responsible for preparing the budget is the project manager, which is done during the initiation of the project. He/she will also be responsible for managing and reporting on the project's cost throughout the duration of the project. During the monthly project status meeting, the project manager will meet with management to present and review the project's cost performance for the preceding month. However, many IT professionals think that preparing cost estimates is a job for accountants. On the contrary, preparing good cost estimates is a demanding, important skill that many professionals need to acquire. In addition the project manager has the responsibility of managing the budget during the project's execution phase. The level of complexity of the budget should be commensurate with the overall complexity of the project (Schwalbe, 2014)

2.3 Project Cost Management

Cost is one of the main considerations throughout a project's lifecycle and can be regarded as a significant parameter of a project and the driving force of project achievement. Project cost management includes the processes required to ensure that the project is completed within an approved budget. It is the process of ensuring that a project is completed within the approved budget and that cost variances are proactively managed throughout the project.

According to Schwalbe (2014), project cost management includes the processes required to ensure that a project team completes a project within an approved budget. There are four processes for project cost management:

1. Planning cost management involves determining the policies, procedures, and documentation that will be used for planning, executing, and controlling project cost. It's the first step in project cost management which determines how the costs will be managed throughout the life of the project.

Effective cost planning relates design of the project to its cost, so that while taking full account of quality, risks, likely scope changes, utility and appearance, the cost of a project is planned to be within the economic limit of expenditure (Ahiaga-Dagbui, Smith, Love & Ackermann, 2015).

2. Estimating costs involves developing an approximation or estimate of the costs of the resources needed to complete a project. Project managers must take cost estimates seriously if they want to complete projects within budget constraints. After developing a good resource requirements list, project managers and their project teams must develop several estimates of the costs for these resources.

Cost estimates prepared in the early stages of a project allow a client to evaluate most economical tenders, secure funding or perform a cost-benefit analysis. These estimates also often become the basis for cost control during project delivery (Ahiaga-Dagbui, Smith, Love & Ackermann, 2015)

According to an article by PM4DEV (2015), there are three types of estimates

Rough Estimate- Project managers develop the first budget estimate used before or during the project initiation phase to get a quick estimate of what the costs of the project should be and to see if there is an interest in the organization or donor. It provides a rough idea of the project budget. Estimates are based on high-level objectives and it provides a quick view of the project deliverables. Most rough estimates, depending on the project, have a range of variance from – 25% to +75%. The project manager shouldn't invest too much time in creating these initial estimates. Rough estimates are simply used to have a good look at the project's initial perceived costs, and should not be used as a definitive estimate or an estimate for RFP purposes.

Budgetary Estimate- is used to allocate money into an organization's budget. Many organizations develop budgets at least two years into the future. Budgetary estimates are made one to two years prior to project completion. The accuracy of budgetary estimates is typically -10 percent to +25 percent, meaning the actual costs could be 10 percent less or 25 percent more than the budgetary estimate

Definitive Estimate- is the most accurate of the estimate types, but takes the most time to create. The definitive estimate makes use of the work breakdown structure; which is a deliverables oriented decomposition of the project scope. This type of estimate is usually made during the planning phase of the project to get detailed information on all the project costs. The definitive estimate is used to for estimating final project costs and used for making purchase decisions where the actual costs are required before making payments. The definitive estimate is used

throughout the project life cycle and updates as soon as new information is made available. The accuracy of this estimate is normally -5 percent to +10 percent, meaning the actual costs could be 5 percent less or 10 percent more than the definitive estimate.

3. Determining the budget involves allocating the overall cost estimate to individual work items to establish a baseline for measuring performance. It involves allocating the project cost estimate to individual material resources or work items over time. These material resources or work items are based on the activities in the work breakdown structure for the project. The main goal of the cost budgeting process is to produce a cost baseline for measuring project performance and to determine project funding requirements.

4. Controlling costs involves controlling changes to the project budget. Controlling project costs includes monitoring cost performance, ensuring that only appropriate project changes are included in a revised cost baseline, and informing project stakeholders of authorized changes to the project that will affect costs. Performance review meetings can be a powerful tool for helping to control project costs. People often perform better when they know they must report on their progress. Another very important tool for cost control is performance measurement.

2.4 Project Schedule

A schedule is an established date which shows when project work starts and ends. Projects are usually undertaken with their deadlines, there is a time limitation and one should be able to deliver the projects within the specified time frame. To determine the amount of time you need for any project, you have to determine the order in which you perform the activities and how long each individual activity takes (Portny, 2010)

A project always has a planned end date. To help ensure that the end date coincides with the actual completion of the project, a detailed schedule must be prepared. This schedule must list key phases, tasks, and milestones. It should also list who is responsible for performing these tasks or meeting the milestones and show dependency relationships among task (Benator & Thumann, 2003)

According to Khorraim (2013), the schedule of a project should reflect the scope of the project. It should be able to include what the project plans to accomplish by taking the work to be done in to consideration.

The schedule serves as the basis for monitoring and controlling project activity and, in addition to the project plan and budget; it's probably the major tool for the management of projects. It illustrates the interdependence of all tasks, work packages, and work elements, it denotes the times when specific individuals and resources must be available for work on a given task, it determines an expected project completion date, it identifies the critical activities that if delayed will delay the project completion time, it also identifies activities with slack that can be delayed for specified periods without penalty, it determines the dates on which tasks may be started or must be started if the project is to stay on schedule, it illustrates which tasks must be coordinated to avoid resource or timing conflicts (Meredith & Mantel 2009).

If a project manager doesn't plan, coordinate, and control the schedule the project probably will not make the final deadline. Scheduling techniques, when applied in the project environment, can help anticipate and solve problems, get the team working together, and advance each project with the final deadline in mind (Thomesett, 2010)

2.5 Project Time Management

Scheduling project work is an essential element of project management. A project schedule makes it clear to all participants when work is expected to be completed. It also shows the time related dependencies between different project tasks. Schedule management is the process of ensuring that the project schedule is baselined, maintained, and managed accordingly

According to Schwalbe (2014), project time management involves the processes required to ensure timely completion of a project. Seven main processes are involved in project time management:

1. Planning schedule management which involves determining the policies, procedures, and documentation that will be used for planning, executing, and controlling the project schedule.

2. Defining activities which involve identifying the specific activities that the project team members and stakeholders must perform to produce the project deliverables. An activity or task is an element of work normally found on the work breakdown structure that has expected duration, cost, and resource requirements. Defining activities involves identifying the specific actions that will produce the project deliverables in enough detail to determine resource and schedule estimates.

Milestones are significant accomplishments that typically are the culmination of a series of tasks. A milestone on a project is a significant event that normally has no duration. It often takes several activities and a lot of work to complete a milestone, but the milestone itself is like a marker to help in identifying necessary activities. Milestones are also useful tools for setting schedule goals and monitoring project progress.

3. Sequencing activities involves identifying and documenting the relationships between project activities. The sequencing process involves evaluating the reasons for dependencies and the different types of dependencies. A dependency or relationship pertains to the sequencing of project activities or tasks.

4. Estimating activity resources involves estimating how many resources; people, equipment, and materials that a project team should use to perform project activities. Before you can estimate the duration for each activity, you must have a good idea of the quantity and type of resources (people, equipment, and materials) that will be assigned to each activity. The nature of the project and the organization will affect resource estimates.

5. Estimating activity durations involve estimating the number of work periods that are needed to complete individual activities. It is important to note that duration includes the actual amount of time worked on an activity plus elapsed time.

6. Developing the schedule involves analyzing activity sequences, activity resource estimates, and activity duration estimates to create the project schedule. Schedule development uses the results of all the preceding project time management processes to determine the start and end dates of the project and its activities.

The ultimate goal of developing a realistic project schedule is to provide a basis for monitoring project progress for the time dimension of the project. Several tools and techniques assist in schedule development:

- A Gantt chart is a common tool for displaying project schedule information.
- Critical path analysis is a very important tool for developing and controlling project schedules.
- Critical chain scheduling is a technique that focuses on limited resources when creating a project schedule.
- PERT analysis is a means for considering schedule risk on projects.

7. The final process in project time management is controlling the schedule. Controlling the schedule involves controlling and managing changes to the project schedule. The goal of schedule control is to know the status of the schedule, influence the factors that cause schedule changes, determine that the schedule has changed, and manage changes when they occur. Some of the tools and techniques include:

- Performance reviews, where progress reports are often provided
- Schedule change control system, operated as part of the integrated change control system
- A scheduling tool and/or project management software, such as Project 2010 or similar software
- Variance analysis, such as analyzing float or slack and using earned value
- What-if scenario analysis, which can be done manually or with the aid of software
- Adjusting leads and lags
- Schedule compression, such as crashing and fast tracking
- Resource optimization techniques, such as resource leveling

Many issues are involved in controlling changes to project schedules. It is important first to ensure that the project schedule is realistic. Many projects, especially in IT, have very unrealistic schedule expectations. According to Roberts (2014), the list of activities, their duration, and the interconnected logic of the sequence of execution are the usual parameters for the development of a realistic schedule

It is also important to use discipline and leadership to emphasize the importance of following and meeting project schedules. Although the various tools and techniques assist in developing and managing project schedules, project managers must handle several personnel related issues to keep projects on track.

Project managers must also use discipline to control project schedules. Several IT project managers have discovered that setting firm dates for key project milestones helps minimize schedule changes. Insisting that important schedule dates be met and that proper planning and analysis be completed up front helps everyone focus on doing what is most important for the project. This discipline results in meeting project schedules. Project managers must review the actual work and develop a good relationship with team members to ensure that work is completed as planned or changes are reported as needed

2.6 Cost Overrun and Schedule Delay

As cited by Ahmed, Farooqui & Azhar (2008), cost overrun can be simply defined as when the final cost of the project exceeds the original estimates (Avots, 1983). It's the excess of actual cost over planned budget, it's the additional amount of money required to deliver the project.

As cited by Subramani , Sruthi & Kavitha (2014) cost overrun is the difference between the actual and estimated costs. Actual costs are defined as the accounted costs actually spent as determined at the time of project completion. Estimated costs are defined as the budgeted or forecasted costs at the time of project approval, which are typically similar to costs presented in the business case for a project (Lee, 2008).

As cited by Kikwasi (2012), Pickavance (2005) defines delay as something happening at a later time than planned, expected, specified in a contract or beyond the date that the parties agreed upon for the delivery of a project. It occurs when the progress of a contract falls behind its scheduled program.

Delays are incidents that impact a project's progress and postpone project activities; delay causing incidents may include weather delays, unavailability of resources, design delays, etc. Schedule delay is defined as the time increased to complete the project after planed date which can be caused by internal and external factors surrounding the project (Al-Najjar, 2008)

As cited by Jia (2015), the triple constraints have their own respective effect on the project performance, they have correlation with each others, any of the one constraints has bears effect on the other two (Brewer & Dittman, 2010). If change happens on a constraint, another two constraints also will influence by the changes.

As cited by Saeed (2009), Abdalla et al (2002) argues that projects encounter massive delays and thereby overshoot the initial time and cost estimates which in turn result in extensive delays providing a platform for claims and disputes.

From the above scholarly arguments it's evident that the two variables are highly interrelated and interdependent. If the schedule of the project is extended then it will bring a significant overrun of cost on the project. For example, the entire team may agree on the schedule and proceed with phase one, but it would take only one unexpected delay to throw off the entire schedule. Without a continual supervision, such delays certainly arise. Even when you supervise carefully, you need to be prepared for the unexpected. A small delay within one phase would not be a problem if the shortfall could be absorbed within subsequent phases. But chances are that a single delay near the beginning of the project will carry over in further delays affecting all phases yet to come and the entire project cost as a whole.

Generally, we can understand that if any alteration or adjustment is made to any of the two variables then it in turn will affect the other one. Thus one can say a project with a delayed schedule will require additional money and resources to deliver the project.

2.7 Reasons for Cost Overrun

As cited by Abubeker (2015), one of the major causes of cost overrun according to Peeters & Madauss (2008) is inaccurate or poor estimation of original cost. This problem usually arises due to technical problem on how to estimate project costs and also not having enough project information in the early stage of project.

Schwalbe (2014), also indicates that poor cost estimation can be the result of estimates being done too quickly. Developing an estimate for a large software project is a complex task that requires significant effort. Many estimates may be done quickly and before clear system requirements have been produced. In addition people lack estimating experience. The people

who develop software cost estimates often do not have much experience with cost estimation, especially for large projects. They also do not have enough, accurate and reliable project data on which to base estimates.

According to Markgraf (2017) a common reason for cost overruns is the inaccuracy of cost estimates. Such cost overruns are due to either incorrect estimates or to changed conditions in the marketplace. It is important to review cost estimates before placing orders to identify mistakes or changed conditions. In addition, the project progresses according to a plan that assigns durations to project tasks. If the projected duration is too short, the project takes longer than anticipated and cause cost overruns. Monitoring project tasks on the critical path, which is the task sequence from project start to finish that takes the longest to complete helps reduce the risk of delays.

The accuracy of estimates is vital for any project especially at the preliminary stages. These estimates would enable the owner to take the crucial decision of whether to undertake the project at all or not. In projects which are in the design stage where there is an urgent requirement of the estimated cost there usually thumb rules are applied for providing the estimates. An incorrect task description or assessment may result in an incorrect or overambitious estimate which may either derail the project or make the project too costly and uneconomical for the owner.

According to Subramani , Sruthi , & Kavitha (2014), another cause for cost overrun can be slow decision making and poor design/delay in providing design. When decisions are dragged because of different reasons then the project will freeze but certain costs will continue to be incurred hence contributing to cost overrun. In addition to this delay in providing designs means delay in the next phases of the project which will cost the project additional money.

Incompleteness of project design can also cause the actual project cost to be different from the initially estimated cost. The initial design may turn out to be inadequate for the actual project conditions. If the work conditions turn out to be different from those for which project was designed, there will be a change in the quantities of work items. As a result, the actual quantities and costs are bound to be different from the estimated ones (Singh, 2011).

The detailed design of a project is used to assess the quantities of materials required and the actual work involved in implementing a project. Drawings and lists of quantities are then used to produce detailed project costs and to establish an implementation timetable. This will not only

help mitigate the problem of cost overrun and schedule delay but also helps in developing a clear and detailed requirement statement.

A design with errors practically means wrong or insufficient representation of project deliverables. This will lead to wrong application of techniques in achieving result, such that as the actual execution phase of the project unfolds these design errors and attempt to correct it will lead to delay and cost overrun. Having errors in design in a form of omission or misrepresentation will mean that the estimation for the project cost will also include these omissions, thereby leading to extra works, rework, change order etc., thus resulting in delay and cost overrun.

According to Singh (2011), due to design related problems the need for supplementary works generally arises. Supplementary works cause an addition to the list as well as quantities of work to be accomplished by the project team. Additional works inevitably lead to an increase in the project costs, even if there is no increase in the price rate of work items.

Another perceived reason for cost overruns is that many IT projects involve new technology or business processes. Any new technology or business process is untested and has inherent risks. Thus, costs grow and failures are to be expected (Schwalbe, 2014)

Buys (2015) identified another reason for delay and cost overrun in project could be as a result of scope change. Execution of a project after a scope change will mean that the entire initial project plan will have to be reviewed such that a reviewed budget, schedule and quality will have to be developed. This means more time and resources will be needed. With each scope change, precious project resources are diverted to activities that were not identified in the original project scope, leading to pressure on the project schedule and budget. Project scope change could be as a result of wrong initial scope definition, inherent risk and uncertainties, sudden change of interest, new requirement need, project funding change, etc. this could lead to change request which in turn could lead to change in project deliverables, budget and/or even the entire project team.

Another reason by Roberts (2014) is poor planning. Planning is one of key factors that affect the success of any project because “Fail to plan is a plan to fail”. The project manager should pay a lot of attention to this area and give it enough time and effort regardless of time pressure. They

should be aware of bad results when a project plan is non-existent, out of date, incomplete or just poorly constructed.

The more detailed planning the higher the chances of success because the project manager will not only be able to have a clear path laid out but also he/she will be able to identify risks and plan their management. Instead of handling them as they arise which will require more money and time. Each and every activity that is expected down the line gets due attention.

Planning for risks and their management will help the project manager notice warning signs and help him/her prepare to implement a plan to manage the risk that would otherwise be too costly or even impossible to manage. The risk management plan will help in getting the much required information related to the risks and deriving a strategy to manage the risks and thereby the potential losses to the project. Thus risk management can be considered as a process for the development of strategies to maintain project performance that would be acceptable to all project stakeholders (Saeed, 2009)

As cited by Al Neimat (2005), sometimes IT managers are not given the opportunity to plan because time pressure from senior management and mostly because the project is underway before it has been clearly defined (New Zealand Management, 2003).

Proper cost management is integral to alleviate the problem of cost overrun. The objectives of effective cost management process are to track progress, compare actual values to planned values, analyze the impact of variances, and make adjustments in light of these variances. It is the process used to minimize the cost of the project while maintaining acceptable levels of quality as well as the scope of the deliverables for the duration of the project (Rad, 2002)

2.8 Reasons for schedule delay

Project complexity can also be a contributing factor to delay and cost overrun. Complexity could be define in terms of the size of the project, most mega projects tend to have relatively long implementation period when compared to small project. This could be affected by inflation, change in material price and changes in exchange rates such that the initial budget may need to be supplemented for the project to be completed. The result could be cost overrun and long

chains of negotiation which will lead to delay. In addition, projects with high degree of complexity usually result in complex plans, schedules and estimations. Thus, if care is not taken the tendency of omitting certain aspect of the project plans and/or estimation could be prominent, thereby leading to change orders in the future phases of the project (Buys, 2015)

As indicated by Saeed (2009), change is the primary cause for a delay. If projects do not have changes then the projects would finish on time as there would be no or little disruptions to the works. In reality changes are inherent to nearly all project of substantial size due to the fact that projects rarely commence after all the designs are completed and approved. The continuous striving for improvement makes it necessary to incorporate changes even though they may disrupt the works to a certain extent. However, the overall result is likely to be better than the initial after incorporating the changes and the satisfaction of achieving a better final product makes the changes more acceptable rather than no changes at all.

If any major changes proposed when the project is in an advanced stage of progress it will complicate the works, impact the schedule and likely to cause delays to the completion. The changes will increase the cost of the project as abortive works, modification and changes will come with a cost.

When team members required schedule changes, after the initial project baseline had been approved, the changes have to be approved by the IT project manager. Before approval of the changes the IT Project Manager should ensure that rippling effects were avoided or kept at a minimum. Once approved, the project schedule will be changed accordingly and then a new baseline will be created (Roberts, 2014)

There are numerous stages in a project where a bad quality of works can result in rework or abortive works and increase the cost. This additional works to correct the already faulty work can also increase the original duration of the project (Saeed, 2009).

The lack of task clarity can give rise to errors as adequate details will not be available and hence changes may be required to rectify the errors or incorporate the additional details as per the new information made available. This has an impact on the cost in terms of cost overruns and time in terms of delay which affects the performance of the project. It is important to realize the impact such errors and changes and work to mitigate their negative effects on the project.

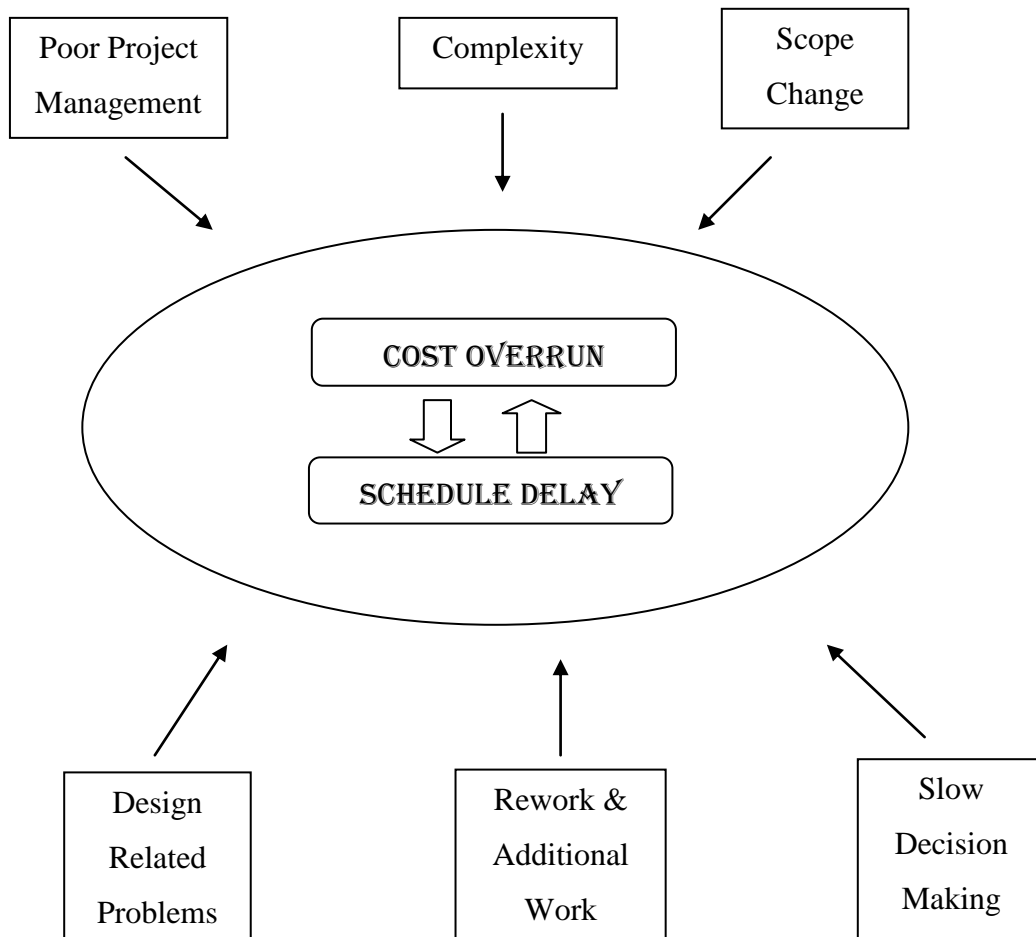
Sometimes the goal of a project may be only partially clear due to a poor requirement gathering and statement in the definition stage of a project (Glaser, 2004). Defining clear requirements for a project can take time and lots of communication, during which time the project incurs cost as time flies by.

Effective management can reduce the delays and save on costs by up to 20% as per the data available for the United States. The essential elements of good project management include cost control and time control.

The role of the project manager or project management team is probably the most important element in containing the costs of a project. It is often true that a poor project with a good project manager will be completed satisfactorily. But even a good project, if combined with poor project management, will almost always face serious difficulties. A poor project management structure will have an impact at all stages of the project process leading to lack of control over time and cost inputs

The key to successful completion of any project is the optimum utilization of the resources and by achieving the productivities as planned in the schedule. Also, the deployment of the required resources at the appropriate time is absolutely essential in the success of any project. This mapping of resources for a project is the key to any projects success. Effective project planning and control, resource management has been a very important part of project management. This implies that properly handling these activities will help project managers achieve the project goals.

2.9 Conceptual Framework



2.10 Background of the Organization

The National Bank of Ethiopia was established in 1963 by proclamation 206 of 1963 and began operation in January 1964. Prior to this proclamation, the bank used to carry out dual activities, i.e. both commercial banking and central banking. Following the proclamation the National Bank of Ethiopia was entrusted with the following responsibilities.

- To regulate the supply, availability and cost of money and credit
- To manage and administer the country's international reserves
- To license and supervise banks and hold commercial banks reserves and lend them money
- To supervise loans of commercial banks and regulate interest rates
- To issue paper money and coins
- To act as an agent of the government
- To fix and control the foreign exchange rates

This proclamation was in force till the new proclamation issued in 1994 to reorganize the bank according to the market based economic policy so that it could foster monetary stability, a sound financial system and such other credit and exchange conditions as are conducive to the balanced growth of the economy of the country. Accordingly the following are some of the powers and duties vested in the bank by proclamation 83/1994.

- Regulate the supply and availability of money & credit and applicable interest and other changes
- Set limits on gold and foreign exchange assets which banks and other financial institutions authorized to deal in foreign exchange can hold in deposits
- Set limits on the net foreign exchange position and on the terms and amount of external indebtedness of banks and other financial institutions.
- Make short and long-term refinancing facilities available to banks and other financial institutions.

Currently NBE has three clusters and 20 directories one of which is ISMD, the information systems management directorate. The information system directorate manages IT related tasks and projects. The ISMD directorate has six teams under it; Knowledge management, Application, Database, Security, Network and Infrastructure, and User Support team.

ISMD controls and manages the VPN which connects commercial banks and financial institutions like MOFED and ERCA with NBE and each other. It also manages systems that are used to ease the financial system, like its CORE banking which helps to manage the distribution of money and purchasing of gold beside many other functionalities.

2.11 Project Description

According to Nebat Nurhussen who is a senior systems admin, the concept of virtualization is to obstruct the system from the hardware and run operating systems, in this case virtual machines on one hardware by using hypervisor. For this project NBE planned to run two financial systems EATS and CIC on the same platform by using this new technology.

According to the project manager Ato Dawit Tesfaye the project was initially designed to upgrade EATS, however after purchase of the equipments was made the concept of virtualization was proposed. This proposal intended to entertain 5 systems on the platform that was purchased for EATS. This raised objections thus only the two systems, EATS and CIC were proposed to be undertaken as part of the virtualization project.

EATS (Ethiopian Automatic Transfer system) which is used for gross settlement between commercial banks through checks. And the other CIC (Credit information system) formally known as Ethiopian Credit Reference Bureau which is used to centralize the information of loan at the central bank by using TIN number as identifier.

The aim of the application virtualization project is to run the two systems EATS and CIC on the same platform by allowing them to share the infrastructure and thereby manage the resource accordingly. The main goal is to minimize the cost that is spent on the hardware and increase high availability of data, thereby making systems available by making them robust and withstanding failure.

Even though the project was commenced it still faces many problems including schedule delay and cost overrun. The schedule of the project was delayed by 242% and the cost of the project by approximately 148%. This cost is to be incurred in the near future, as the project moves forward and proceeds to the next phase as most of the hardware, software and licenses are going to be replaced by a totally new platform. This is because the current platform cannot sustainably entertain/ handle the two systems efficiently because of capacity and resources reasons. This means once this project is live it will operate for a few months and the platform will be changed and then full operation will begin. Though the project was designed so that it will sustain for 5 years due to the above mentioned reasons it will only run for less than a year.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter basically describes how the study was carried out, the data collection methods that were used, its analysis and presentation. It is a very important chapter as it provides reasons to why a particular method of research, sampling, data collection and data analysis were chosen; it also gives the design of the study, population and the area on which the research was based on. In short this chapter is concerned with research design, which is the master plan specifying methods and procedures for collecting and analyzing collected data.

3.2. Research Design

The research design refers to the researcher's overall plan for obtaining answers to the research questions; it's a road map for achieving the research objectives of the study.

A case study is an intensive study of a single unit for the purpose of understanding a larger class of similar units (Gerring, 2004). Adams, Khan, Raeside, & White (2007), argue that case studies are used to study particular phenomena in particular settings. The case study method is very common in business research and is particularly useful for the analysis of organizations. A case study is an in-depth study which explores issues, present and past, as they affect one or more units (organization, group, department or person).

According to Marczyk, DeMatteo, & Festinger (2005), case studies involve an in-depth examination of a single person or a few people. The goal of the case study is to provide an accurate and complete description of the case. The principal benefit of case studies is that they can be immediately applicable to the participant's diagnosis or treatment.

Case studies are most commonly associated with qualitative research and qualitative data, however this should not be since quantitative data can readily be incorporated into a case study where appropriate. One of the greatest strengths of the case study design is its adaptability to different types of research question and to different research settings. Case studies also offer the

benefit of studying phenomena in detail and in context. Another potential advantage of case studies is that the format may make the research accessible to wider readership than some other designs (Rose, Rose & Canhoto, 2015).

According to Zainal (2007), case study research allows the exploration and understanding of complex issues. It can be considered a robust research method particularly when a holistic, in-depth investigation is required. By including both quantitative and qualitative data, case study helps explain both the process and outcome of a phenomenon through complete observation, reconstruction and analysis of the cases under investigation. In most cases, a case study method selects a small geographical area or a very limited number of individuals as the subjects of study and present data of real life situations and they provide better insights into the detailed behaviors of the subjects of interest.

Because of the topical scope and the above stated arguments, the research design adopted for this study was a case study approach. This design was appropriate because of the nature of the study and the research questions were designed in such a way that they address key issues on identifying the factors causing cost overrun and schedule slippage in the application virtualization project at NBE.

3. 2.1 Data Collection Techniques

Since it will be difficult to rely on one method of data collection; the researcher employed both qualitative and quantitative data collection techniques in order to counterbalance shortcomings of each technique. Thus, a mixed research approach is used for this study.

As cited by Saunders, Lewis & Thornhill (2007), Tashakkori & Teddlie (2003) argue that multiple methods are useful for they provide better opportunity to answer the research questions and allow you to better evaluate the extent to which your research findings can be trusted and inferences made from them. The two major advantages of using multiple methods are; first different methods can be used for different purposes in a study and second it enables triangulation to take place.

3. 2.2 Source of Data

Both primary and secondary data were used to answer the research questions. According to Currie (2005), combining several methods in the same single study is important to triangulate the result of each method involved. Relying on a single method can adversely affect the reliability and validity of the results and ultimately affecting the conclusions drawn and the recommendations made. Most of the information was obtained through books, journals, reports, interviews and questionnaires.

3.2.2.1 Secondary Data

Secondary data is the data that have been already collected by and readily available from other sources. The researcher used different textbooks, journals, dissertations as secondary source of data. These sources were used as a supplement to the primary data that was collected by the researcher as making conclusion and recommendation based solely on secondary data was insufficient and inadequate.

3.2.2.2 Primary Data

The decision to collect primary data for a research is influenced by the kind of research one is carrying out. The need for primary information is far more frequently related to the practical, rather than the academic aspects of study. You carry out primary research when the data you need is not available from published sources (Currie, 2005).

Primary data is data that's collected for specific research problem at hand using procedures that fit the research problem best. On every occasion that primary data is collected new data is added to the existing stock of knowledge (Hox & Boeije, 2005).

The primary data was original and relevant to the topic of the research study so the degree of accuracy is very high, it is current and it gave a better realistic view to the researcher about the topic under consideration. The primary data was conducted using questionnaires and interview.

3.2.3 Area of the Study

The study is on an IT project at NBE entitled Application Virtualization Project. The choice of this area of the study was based on the fact that this project experienced significant amount of cost overrun and schedule delay and because the project is essential for the organization.

3.2.4 Population of the Study

A research population is the entire group of people or objects that are of interest to the researcher. The study population for this research is the IT personnel who are responsible for the development of different IT software and systems for the bank, which would mean the 75 employees in the ISMD at National Bank of Ethiopia.

3.2.5 Sampling Techniques and Sample Size

It is always not possible to study the entire population, thus researchers make use of a sample to select research subjects who would represent the whole research population and the research problem. A sample is a subset of the population selected to participate in the study and to be representative of the larger population (Acharya, Prakash, Saxena & Nigam, 2013).

The sampling technique to be used depends on the type, nature and purpose of the study. Non probability sampling is a sampling technique where the samples are gathered in a process that does not give all the participants or units in the population equal chances of being included. The purposive sampling technique, also called judgment sampling, is the deliberate choice of a participant due to the qualities the participant possesses.

To engage in purposive sampling signifies that one sees sampling as a series of strategic choices about with whom, where and how one does ones research. This implies that the way that researchers sample must be tied to their objectives. A second implication is that there is no one best sampling strategy because which is best will depend on the context in which the researcher is working and the nature of the research object that's undertaken (Palys, 2008).

The main goal of purposive sampling is to focus on particular characteristics of a population that is of interest, which will best enable the researcher to answer the research questions. In simple terms, the researcher decides what needs to be known and sets out to find people who can and are willing to provide the information by virtue of knowledge or experience. When using purposive sampling the researcher has something particular in mind and participants that suit the purpose of the study are included. In purposive Sampling subjects are selected based on study purpose with the expectation that each participant will provide unique and rich information of value to the study (Etikan, Musa & Alkassim, 2015).

The researcher focused on the factors that are causing the application virtualization project to be over budget and overdue. Thus, to enable the researcher to obtain a sample of suitable participants and to address the issue raised above the researcher had to communicate with the people that are directly or indirectly related to the project. The purposive sampling method was chosen as the most fitting method for this research as it enabled the researcher to focus particularly on the issue of cost overrun and schedule delay on the selected project. This sampling method allowed the researcher to focus on the subjects that are representative of the phenomenon being studied.

The researcher was aware that the sample selected may not represent the total IT industry and that it would limit the generalization of the findings. However, the researcher decided that was the best method to use as covering the entire organization and determining a sample size using another technique would be inappropriate because the outcome of the study might become irrelevant. Thus, using a non-probability sampling method that conforms to this particular criterion was sensible.

Hence, the sample for this study was limited to the project team which is comprised of 8 IT personnel from NBE, 4 from INSA and 3 from USI. This means a total of 15 respondents were identified for the questionnaire. In addition, the project manager and 2 members of the steering committee were also included in the study. These 3 people were part of the unstructured interview.

3.2.6 Research Instruments

Primary data was collected using questionnaires and interviews. Questionnaire is a set of questions which were prepared to ask a number of questions and collect answers from respondents relating to the research topic. The questionnaires were distributed to those who are included in the sample. Questionnaires help elicit employees' opinions of the issue under study and help the researcher obtain information about their perceptions of the problem. Both closed and open ended questions were included. The open ended questions allowed the participants to give their own opinion, views, beliefs and other information freely.

The questionnaire was accompanied by unstructured interview to selected managerial staffs that are involved in the project. Interview method entails face to face conversation between interviewer and interviewee, which aims at gathering certain information. Interview questions were prepared as guideline. As the interviewer personally met the informants and asked necessary questions regarding the subject of enquiry, there were no chances of non-response. An important advantage of using an interview is that the researcher was able to explain and expatiate on questions, what they imply, in case they were not clear to the interviewee.

To check the accuracy of the collected data the researcher should compare the correctness of the answers which are given on questionnaires and those answers given through unstructured interviews. Interview also gives respondents freedom to ask in case of need. In addition, the method also ensures high response rate as compared to questionnaire (Babbier, 1989).

3.2.7 Validity and Reliability of the Study

Reliability refers to the stability, consistency or dependability of an instrument. An instrument which is reliable measures accurately and reflects the true score of the attributes under investigation. Validity refers to the degree to which an instrument measures what it is supposed to measure, and therefore an unreliable instrument cannot be valid (Polit & Hungler, 1999).

The reliability of the Likert scale questionnaire items was checked by the Cronbach-Alpha test using SPSS software. The items on the questionnaires included the schedule management practice, the factors responsible for schedule delay, the cost management practice and the causes of cost overrun. Reliability test was conducted for each of these elements and the Cronbach-

Alpha test scored at 0.841, 0.715, 0.764 and 0.835 respectively. Thus, the score supports the presence of good internal consistency among the items and promise the reliability and acceptability of the study items. To ensure the validity, the researcher made use of different literature for both the questionnaire and the interview questions. The instruments were developed after the researcher studied the literature on the research area.

3.2.8 Data Analysis Techniques

Data analysis is the systematic organization and synthesis of the research data; it also involves categorizing, ordering, manipulating and summarizing the data and describing them in meaningful terms (Brink, 1996)

Data was collected, analyzed and presented in such a way that helps the researcher answer the research questions and meet the objective of the study from which conclusions and recommendations were drawn.

The analysis was based on the statement of the problem, research objective and research questions. This study was qualitative in nature; therefore the collected quantitative and qualitative data were coded, analyzed and interpreted. The data from the closed ended questions were coded and entered to SPSS version 20.00 so as to analyze and summarize the data descriptively using tables, percentages and frequency. The open ended questions from the questionnaire and the interview questions were categorized by hand by the researcher in a generalizable format. Finally, all the data has been presented to the reader in a readable format by further explaining the case using discussions. After which conclusion was made about the particular case and recommendation were delivered by the researcher.

3.2.9. Ethical Considerations

Ethical considerations are very important in any research. As a result the consent of the participant was sought first and the researcher did not in any way forcefully influence the decision of the respondents by coercion or other means to deliver the information against their wishes. Moreover, data and information collected from the participants were treated as private and confidential documents and was used for the purpose of the study only.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents the result of the data obtained from the respondents using questionnaire and interview. The results are presented by using descriptive statistics. To analyze the collected data SPSS Statistics version 20.00 was used. The data regarding the causes of cost overrun and schedule delay is presented as follows.

4.2 Descriptive Statistics and Respondents Profile

The questionnaire was developed using Linkert scale; where 1 represents Strongly Agree, 2 Agree, 3 Neutral , 4 Disagree and 5 Strongly Disagree. Among the 15 (100%) questionnaires that were distributed to the project team members 15 (100%) questionnaires were filled and collected. Descriptive statistics was used to analyze the questionnaires that were collected. The collected questionnaires were inserted in to SPSS version 20.00 in order to make an analysis of the data, which enabled to present using frequency and percentage. For further understanding of the subject matter unstructured interview was conducted with the project manager and two members of the steering committee. The questionnaire and the interview questions used are attached to this research paper under appendix section.

4.3 Characteristics of the Respondents

Respondent's characteristics include their educational level, overall work experience, current job title and the organization they are part of. The responses of the respondents and the implications are illustrated hereunder.

Table 4.1. Characteristics of the respondents

Items		Count	Column N %
Name of organization you're part of	INSA	4	26.7%
	NBE	8	53.3%
	USI	3	20.0%
Gender	Male	10	66.7%
	Female	5	33.3%
Level of education	First Degree	13	86.7%
	Second Degree	0	0.0%
	Masters	2	13.3%
	PhD	0	0.0%
	Other	0	0.0%
Relevant working experience	1-3Yrs	2	13.3%
	3-5Yrs	4	26.7%
	5-10Yrs	7	46.7%
	>10Yrs	2	13.3%

Source: Own survey, 2017

Among the 15 respondents that are part of the application virtualization project 4 (26.7%) are from INSA, 53.3% are from NBE and 3(20%) are from USI. This implies that the bank tried to use most of its employees instead of fully subcontracting the project to the other partners.

For the next item 10 (66.7%) of the team members are male and the rest 5 (33.3%) are female. When we look at their educational qualification 86.7% have their first degree and 13.3%, which means only 2 people have their masters.

In terms of working experience, 46.7% of the team members have an experience of 5-10 years while 26.7% have an experience of 3-5 years. 13.3% have an experience of 1-3 years. Only two people, 13.3% have experience working in the IT industry for over 10 years.

Table 4.2. Job titles according to their organization

Name of organization you're part of			Frequency	Percent	Valid Percent	Cumulative Percent
INSA	Valid	Network Systems Engineer	4	100.0	100.0	100.0
NBE	Valid	Application Systems Admin	1	12.5	12.5	12.5
		Systems Admin	1	12.5	12.5	25.0
		Database Admin	3	37.5	37.5	75.0
		Assistant Applications Officer	1	12.5	12.5	87.5
		Chief ICT Senior Officer	1	12.5	12.5	100.0
		Total	8	100.0	100.0	
		USI	Valid	Computing Engineer	3	100.0

Source: Own survey, 2017

The employees from INSA are all network system engineers while those of USI are all, 100% computing engineers. The diversity of the project team can mainly be attributed to the NBE staff which is comprised of 3 (37.5%) database admins, 1 (12.5%) ICT officer, 1 (12.5%) assistant applications officer, 1 (12.5%) systems admin and 1 (12.5%) applications systems admin

4.4 Schedule Management Practice

This section includes items that are selected to examine the time management practice of the bank. There are two tables and are described as flows.

As indicated in the literature the following activities are part of the project time management. These activities should be performed in advance so that the project will proceed smoothly. As indicated in the literature Schwalbe (2014) identified seven main processes that make time management in projects effective.

Table 4.3. Schedule management factors

Items		Count	Column N %
Schedule activities were specifically identified and enough time was assigned for each activity	SA	1	6.7%
	A	2	13.3%
	N	4	26.7%
	D	5	33.3%
	SD	3	20.0%
Enough resource was assigned for to each activity a team member performs	SA	0	0.0%
	A	5	33.3%
	N	1	6.7%
	D	8	53.3%
	SD	1	6.7%
Realistic time was imposed for the project	SA	0	0.0%
	A	4	26.7%
	N	1	6.7%
	D	8	53.3%
	SD	2	13.3%
The project team didn't have any difficulty meeting deadlines	SA	0	0.0%
	A	0	0.0%
	N	3	20.0%
	D	12	80.0%
	SD	0	0.0%

Source: Own survey, 2017

The respondents were asked if schedule activities were specifically identified and enough time was assigned for each activity, 33.3% disagree while 20% strongly disagree. 26.7% were neutral about this issue. 13.3% agree and 6.7% strongly agree that the schedule activities were specifically identified and enough time was assigned for each activity.

In the interview conducted with the project manager it was found out that the project team was not involved while this work was being done thus it's not a surprise if most of them are neutral about the issue. Most of the respondents either disagree or strongly disagree about schedule activities being specifically identified and enough time being assigned and this can be attributed to the misunderstandings that happened when they had to undertake the work and also because the activities were not pre planned as they should have been. According to a member of the steering committee, since the activities were not identified and defined they were not sequenced and their relationship and dependency has not been determined.

The team members were asked if enough resource was assigned for each activity they perform and 53.3% disagree while 6.7% strongly disagree. The remaining 33.3% agree that enough resource was assigned for each activity they perform and 6.7% were neutral about it. According to a member of the steering committee the activities were not identified in detail and resource and money was not assigned to each activity.

As indicated by Schwalbe (2014), identification and definition of each project activity is crucial to a projects success as it helps determine the duration of each activity and also helps in developing an overall schedule for the project. Once identified and defined, relationship and dependency should be determined and adequate resources should be assigned based on the needs of each activity. This is one of the processes that should be performed by the project team and the manager, however in this case this was poorly executed as the activities were not identified in detail, relationships have not been determined and sufficient resource was not able to be distributed as activities were not identified specifically.

The next item which is if realistic time was imposed for the project, 53.3% disagree and 13.3% strongly disagree. 26.7% agree and 6.7% are neutral. According to a member of the steering committee the time estimated for the project was in fact close to reality, however due to the problems that have been encountered in the process the project has not been accomplished according to plan.

As per the literature, a realistic project schedule is a basis for monitoring project progress for the time dimension of the project. According to Roberts (2014), the list of activities, their duration, and their sequence are used for the development of a realistic schedule. When we take a look at this case however, since the activities were not identified and defined, duration estimation for each activity could not be done, thus specific start and end dates were not assigned to each activity and the activities were not sequenced. This implies that the project schedule was a mere approximation and presumption rather than based on logic and planning.

When respondents were asked if they didn't have any difficulty meeting deadlines 80% disagreed and 20% which is 3 members were neutral. Both the project manager and the steering committee members all agree that the project has encountered a lot of difficulty and that has

affected the team in meeting the project deadline. The difficulties encountered by the project team have been identified and discussed in the later tables.

Table 4.4. Schedule management factors

Items		Count	Column N %
	SA	0	0.0%
Top management ensured the proper completion of each milestone through strict supervision	A	3	20.0%
	N	2	13.3%
	D	8	53.3%
	SD	2	13.3%
Project team members received proper guidance and support from superiors to avoid any time delays	SA	0	0.0%
	A	2	13.3%
	N	4	26.7%
	D	8	53.3%
	SD	1	6.7%
The project manager ensured the deadlines were met and changes to the original schedule were handled efficiently	SA	0	0.0%
	A	2	13.3%
	N	1	6.7%
	D	8	53.3%
	SD	4	26.7%

Source: Own survey, 2017

The respondents were asked if top management ensured the proper completion of each milestone through strict supervision. 53.3% disagree and 13.3% strongly disagree while 13.3% are neutral. 20.0% however agree that top management was supervising the project closely.

Project team members were also asked if they received proper guidance and support from superiors to avoid any time delays, 53.3% disagree and 6.7% strongly disagree. 26.7% are neutral and only 2 members which is 13.3% agree that they have received proper guidance.

When respondents were asked if the project manager ensured the deadlines were met and changes to the original schedule were handled efficiently, 53.3% disagree, 26.7% strongly disagree, 6.7% are neutral and 13.3% agree.

According to Schwalbe (2014), one of the processes involved in time management is controlling and monitoring the schedule. This involves determining the status of the schedule and managing changes if any. The above discussed three elements show that most members of the project did not get the necessary support from management and that shows that there is poor schedule control on the side of the project manager, in addition the project manager and other top managers were not delivering the necessary leadership and managerial skills as he was supposed to in order to aid the project team and the progress of the project.

4.5 Causes of Schedule Delay

The elements described below are the reasons why the project didn't meet the planned schedule. The contributing factors for schedule delay are presented in three different tables as follows.

Table 4.5. Schedule delay factors

Items		Count	Column N %
The project is complex and large	SA	5	33.3%
	A	4	26.7%
	N	3	20.0%
	D	3	20.0%
	SD	0	0.0%
Additional work to mitigate problems that arise during the implementation phase	SA	4	26.7%
	A	11	73.3%
	N	0	0.0%
	D	0	0.0%
	SD	0	0.0%
Changes to project scope and emerging new requirements	SA	9	60.0%
	A	6	40.0%
	N	0	0.0%
	D	0	0.0%
	SD	0	0.0%
Poor resource distribution among the project activities	SA	0	0.0%
	A	5	33.3%
	N	6	40.0%
	D	4	26.7%
	SD	0	0.0%

Source: Own survey, 2017

For the first item in table 4.5, 33.3% which is 5 project team members strongly agree that the project was complex and large while 26.7% agree. The rest members are 20.0% neutral and 20.0% disagreeing with the project complexity. This can be attributed to the fact that the both team members and the management were vague about the concept of virtualization until the actual work was started. Both the project manager and the two members of the steering committee indicated that clarity about the project emerged as time went by and as the project started the implementation phase. Thus most members of the project still feel the project is complex because it's still underway and they are learning and knowing about it as they go along.

The project team members were asked if additional work was done to mitigate problems that arise during the implementation phase and 11 of them (73.3%) agree and 26.7% strongly agree. This means that all members of the project team have undertaken additional tasks to counterbalance the problems that arose during execution. Extra work has been accomplished by all the project team members.

When asked about changes to project scope and emerging new requirements 60% strongly agree while the 40% agree that there were changes. This can be backed by the information gathered through interview with the project manager and the two members of the steering committee where all accepted that the project scope has changed and new requirements were included throughout the period. They indicated that the scope of the project changed from upgrading the EATS to the concept of virtualization.

According to Buys (2015), scope change means more time and resources will be needed. With each scope change, precious project resources are diverted to activities that were not identified in the original project scope, leading to pressure on the project schedule and budget and also on the work to be done. In this case the project scope change has contributed to the need for additional work as new activities were identified. Since there was a need to accommodate the newly required features and functions in to the project additional activities had to be undertaken. This in turn has led to the schedule delay.

Project team members rated the poor resource distribution among the project activities as 40.0% neutral, 33.3% agree and the remaining 26.7% as disagree. This again shows the poor project management practice at NBE.

Table 4.6. Schedule delay factors

Items		Count	Column N %
Error in original design	SA	1	6.7%
	A	6	40.0%
	N	5	33.3%
	D	3	20.0%
	SD	0	0.0%
Incomplete design (inadequate or lacks detail and definition, badly developed, incomplete, or incorrect)	SA	3	20.0%
	A	10	66.7%
	N	1	6.7%
	D	1	6.7%
	SD	0	0.0%
Inappropriate and ill defined project requirements	SA	0	0.0%
	A	9	60.0%
	N	3	20.0%
	D	2	13.3%
	SD	1	6.7%

Source: Own survey, 2017

For the first item in table 4.6, 40.0% agree and 6.7% strongly agree that projects original design was full of error, while 33.3% are neutral and 20% disagree. In addition to this 66.7% agree and 20.0% strongly agree that the project design was incomplete, while 60.0% agree that the project requirement was improperly and inadequately defined.

According to the project manager the projects original design and requirement was verified by INSA then after another third party was involved to partially study the design and then provide feedback. Throughout this process it was identified that the initial design had some technical issues which held the project back since corrections were in order.

According to Saeed (2009), a design with errors practically means wrong or insufficient representation of project deliverables. This will lead to wrong application of techniques in achieving result, such that as the actual execution phase of the project unfolds these design errors and attempt to correct it will lead to delay and cost overrun. In this case, since the original design was full of errors and deficient additional time was required to mitigate the problems it created and also to make correction to the original project design.

Table 4.7. Schedule delay factors

Items		Count	Column N %
Delay in approval of different activities due to excessive approval procedures	SA	7	46.7%
	A	8	53.3%
	N	0	0.0%
	D	0	0.0%
	SD	0	0.0%
Delay in the earlier phases (i.e. pre planning and design phase)	SA	7	46.7%
	A	5	33.3%
	N	1	6.7%
	D	2	13.3%
	SD	0	0.0%
Delay in procurement of materials	SA	7	46.7%
	A	4	26.7%
	N	0	0.0%
	D	3	20.0%
	SD	1	6.7%
Delay in decision making (choosing consultants, project team members...)	SA	8	53.3%
	A	5	33.3%
	N	2	13.3%
	D	0	0.0%
	SD	0	0.0%

Source: Own survey, 2017

Respondents were asked if there was delay in approval of different activities due to excessive approval procedures and 46.7% strongly agree while 53.3% agree. A member the steering committee also indicated that that there are a lot of back and forth with top management, the steering committee and the project manager regarding the technical aspects like design and sustainability of the project which has negatively contributed to the project progress.

Delay in the earlier phases (i.e. pre planning and design phase) was rated as 46.7% strongly agree, 33.3% agree, 6.7% are neutral and 13.3% disagree. The project manager also agrees to this point saying that before the execution phase a lot of time was spent adjusting the design and getting approval for it while in parallel dealing with the staff of NBE on the concept of virtualization.

Delay in procurement of materials 46.7% strongly agree, 26.7% agree and 20% disagree. The project manager pointed out that the procurement process was according to the banks procedure and protocol thus it was uncontrollable for him, in addition apart from some materials the procurement of most of the hardware and licenses were done according to plan.

When respondents were asked if there was delay in decision making 53.3% strongly agree, 33.3% agree and 13.3% are neutral. Both the project manager and members of the steering committee stated that there were a lot of meetings taking place without passing any decision because parties were not coming to an understanding and agreement. Because of this even the vice governor was involved to pass final decision on some issues.

According to Subramani , Sruthi , & Kavitha (2014), when decisions are dragged because of different reasons then the project will be sluggish. In this case the approval procedures were slow and the project manager and the steering committee had difficulty passing decisions as there was no understanding and acceptance.

In addition materials were procured slowly, the project team was unable to conduct the work as resources and materials were not readily available. Thus time passed by as no work was done accordingly. Besides this the design phase took longer than planned as errors were noticed which required immediate corrections and amendments by another party. All these in turn had dragged the implementation phase of the project.

4.6 Cost Management Practice

This section is comprised of the items used to measure the cost management practice of the bank. The tables are presented as follows.

Table 4.8. Cost estimation technique

Name of organization you're part of			Frequency	Percent	Valid Percent	Cumulative Percent
INSA	Valid	Rough order of magnitude	3	75.0	75.0	75.0
		Definitive estimates	1	25.0	25.0	100.0
		Total	4	100.0	100.0	
NBE	Valid	Budgetary estimate	8	100.0	100.0	100.0
USI	Valid	Rough order of magnitude	1	33.3	33.3	33.3
		Budgetary estimate	1	33.3	33.3	66.7
		Definitive estimates	1	33.3	33.3	100.0
		Total	3	100.0	100.0	

Source: Own survey, 2017

While 3 members of the project team from INSA, (75%) identified the cost estimation technique to be rough estimation, 1 (25%) said that it was a definitive estimate. The members from USI (33.3%) each selected rough order of magnitude, budgetary and definitive as the technique used to estimate the cost of the project. In the case of the employees from NBE all 8 of them (100%) indicated that the cost estimation technique used was a budgetary estimate.

However, according to the project manager who indicated that expert judgment was used to formulate the cost of the project by basing it on prior more or less similar projects. This shows a huge gap between the project team and management and it also indicates that the project team members and other stakeholders well not involved in the estimation process, in addition they were not disclosed with this information or how the cost came to be.

According to Schwalbe (2014), estimating costs involves developing an approximation or estimate of the costs of the resources needed to complete a project. Project managers must take cost estimates seriously if they want to complete projects within budget constraints. In this case however, since the project manager was the only one who estimated the cost it was open for bias and technical problems as to how to estimate. Furthermore, enough and clear project information about system requirements might not be available in the early stage; consequently he could have used all the help from all the project team members and other stakeholders of the project.

Table 4.9. Cost management factors

Items		Count	Column N %
A realistic cost estimation was developed for the project	SA	0	0.0%
	A	7	46.7%
	N	2	13.3%
	D	6	40.0%
	SD	0	0.0%
The estimated cost was allocated to individual work items effectively	SA	0	0.0%
	A	3	20.0%
	N	9	60.0%
	D	3	20.0%
	SD	0	0.0%
There is a contingency plan	SA	0	0.0%
	A	4	26.7%
	N	5	33.3%
	D	6	40.0%
	SD	0	0.0%

Source: Own survey, 2017

For the first item in table 4.9, 46.7% agree that a realistic cost estimation was developed for the project while 13.3% are neutral and 40% disagree. However, the project manager indicated that he was the only one involved while estimating the costs thus this makes it biased since such complex project requires different inputs and perspectives from different stakeholders.

For the second item in table 4.9, 60% are neutral whether the estimated cost was allocated to individual work items effectively while 20.0% agree and the other 20.0% disagree. The respondents were asked if there was a contingency plan and 40% disagree, 33.3% are neutral and 26.7% agree. This indicates that the team and other stakeholders were not involved in both the

estimation process and when assigning the cost to activities thus they don't know how the cost was distributed among the work activities.

Table 4.10. Cost management factors

Items		Count	Column N %
The project manager closely monitored the cost performance of the project	SA	0	0.0%
	A	1	6.7%
	N	6	40.0%
	D	8	53.3%
	SD	0	0.0%
Variation to the project cost were managed properly	SA	0	0.0%
	A	1	6.7%
	N	11	73.3%
	D	2	13.3%
	SD	1	6.7%

Source: Own survey, 2017

Though the project manager stated that he supervised the project team on a daily basis and had a weekly meeting 53.3% disagree that the project manager closely monitored the cost performance of the project 40.0% are neutral while only 6.7% agree. 73.3% are neutral, 13.3% disagree and 6.7% strongly disagree on how variation to the project cost was managed. This shows that cost related issues were not raised and only technical aspect of the project was discussed between the project team members and the project manager. These shows poor cost management as the project team and other stakeholders should have a say in every aspect of the project including the project cost.

According to Schwalbe (2014), controlling costs is one of the main tasks involved in project cost management. It involves controlling changes to the project budget, monitoring cost performance, ensuring that only appropriate project changes are included in a revised cost baseline, and informing project stakeholders of authorized changes to the project that will affect costs. With regards to this in this particular case one of the stakeholders which are the project team members were not communicated about the overall project cost since estimation to the overall management. In addition all the stakeholders were not involved in the management process. The project manager focused on monitoring other aspects of the projects with little focus to the cost. This all shows than the cost controlling was limited and inadequate.

4.7 Causes of Cost Overrun

The following section discusses the different factors that contributed to the cost overrun of the project. These factors are correlated to the factors that created the schedule delay as the two variables are interrelated and codependent. The factors are presented in two tables as follows.

Table 4.11. Cost overrun factors

Items		Count	Column N %
The project is complex and large	SA	5	33.3%
	A	4	26.7%
	N	3	20.0%
	D	3	20.0%
	SD	0	0.0%
New technology is involved	SA	9	60.0%
	A	6	40.0%
	N	0	0.0%
	D	0	0.0%
	SD	0	0.0%
Rework and additional work	SA	7	46.7%
	A	8	53.3%
	N	0	0.0%
	D	0	0.0%
	SD	0	0.0%
Change to project scope	SA	8	53.3%
	A	7	46.7%
	N	0	0.0%
	D	0	0.0%
	SD	0	0.0%
Design error	SA	0	0.0%
	A	7	46.7%
	N	6	40.0%
	D	2	13.3%
	SD	0	0.0%

Source: Own survey, 2017

The project is complexity was rated as 33.3% strongly agree, 26.7% agree, 20% are neutral and the other 20% disagree about the project complexity. 60% strongly agree and 40% agree that new technology is involved. A member of the steering committee also added that the project team was being trained on the job since the concept and technology was new to the staff and they were not fully equipped with the necessary knowledge and expertise.

Schwalbe (2014), indicated that many IT projects involve new technology or business processes thus contributing to the project sophistication level and complexity. As indicated by Buys (2015), projects with high degree of complexity usually result in complex plans, schedules and estimations. Thus, if care is not taken the tendency of omitting certain aspect of the project plans and/or estimation could be prominent, thereby leading to change orders in the later phase and inherently to cost overrun.

For the forth item in table 4.11, 53.3% strongly agree and 46.7% agree that there were changes to the original project scope while 46.7% strongly agree and 53.3% agree that there was rework and additional work. As explained in the previous section the change to scope means additional time and resources will be needed, with the addition of resource and time it's a given that extra work had to be undertaken to compensate for the change and also make corrections for previous mistakes.

For the fifth item in table 4.11, 46.7% agree, 40.0% are neutral and 13.3% disagree that there are errors to the project design. According to a member of the steering committee because of the technical issues on the initial design different parties were involved in trying to correct it. This ensures that the design was conducted inefficiently and inadequately thus additional money was spent to correct the design and commence with the project.

As indicated by Singh (2011), incompleteness of project design can cause the actual project cost to be different from the initially estimated cost. The initial design may turn out to be inadequate for the actual project conditions. If the work conditions turn out to be different from those for which project was designed, there will be a change in the quantities of work items. As a result, the actual quantities and costs are bound to be different from the estimated ones. This is what has actually happened in this particular case, additional money was spent to correct the design related problems.

Table 4.12. Cost overrun factors

Items		Count	Column N %
Risks were not planned for and improperly managed	SA	1	6.7%
	A	11	73.3%
	N	3	20.0%
	D	0	0.0%
	SD	0	0.0%
Delay between design and procurement phases	SA	5	33.3%
	A	7	46.7%
	N	2	13.3%
	D	1	6.7%
	SD	0	0.0%
Unclear, unstable and incomplete requirement statement and inappropriately assigned cost for it	SA	1	6.7%
	A	11	73.3%
	N	2	13.3%
	D	1	6.7%
	SD	0	0.0%
Inadequate monitoring of funds	SA	1	6.7%
	A	6	40.0%
	N	8	53.3%
	D	0	0.0%
	SD	0	0.0%
Poorly administered cost	SA	1	6.7%
	A	5	33.3%
	N	9	60.0%
	D	0	0.0%
	SD	0	0.0%
Inaccurate estimates	SA	0	0.0%
	A	9	60.0%
	N	2	13.3%
	D	4	26.7%
	SD	0	0.0%

Source: Own survey, 2017

For the first item in table 4.12, 73.3% of the respondents agree that risks were not planned for and improperly managed while 6.7% strongly agree. The remaining 20.0% are neutral. According to Saeed (2009), planning for risks and their management will help the project manager notice warning signs and help him/her prepare to implement a plan to manage the risk

that would otherwise be too costly or even impossible to manage. However, in this case the project team manages unexpected events as they occurred instead of referring to the plan to mitigate them therefore requiring more time and money.

When asked if there was delay between design and procurement phases 46.7% agreed, 33.3% strongly agreed, 13.3% were neutral and 6.7% disagree. According to a member of the steering committee the procurement process was tiresome and delayed.

When asked if the requirement statement was unclear, unstable and incomplete and inappropriately assigned cost for it 73.3% agreed, 6.7% strongly agree, 13.3% are neutral and 6.7% disagree. A member of the steering committee also indicated that the problems in the requirement statement were due to lack of clear understanding about the project. The lack of task clarity can give rise to errors as adequate details will not be available and hence changes may be required to rectify the errors or incorporate the additional details as per the new information made available. This has an impact on the cost in terms of cost overruns and time in terms of delay which affects the performance of the project (Saeed, 2009).

For the forth item in table 4.12, 40% agree that there was inadequate monitoring of funds 6.7% strongly agree and 53.3% are neutral. 60% are neutral about how cost was administered, 33.3% agree that the cost was poorly administered and 6.7% strongly agree. 60.0% agree on the cost being inaccurate estimate, 13.3% are neutral and 26.7% disagree.

According to Rad (2002), the objectives of effective cost management process are to track progress, compare actual values to planned values, analyze the impact of variances, and make adjustments in light of these variances. It is the process used to minimize the cost of the project while maintaining acceptable levels of quality as well as the scope of the deliverables for the duration of the project. Conversely this is not what happened in this case, the project manager and other stakeholders did not give any emphasis to the cost of the project and did not handle issues related to the project cost effectively, thus it can be implied that there is poor cost management.

CHAPTER FIVE

SUMMARY OF MAJOR FINDINGS, CONCLUSION AND RECOMMENDATION

This final chapter highlights the summary of finding, conclusion drawn and recommendation have been provided as per the findings of the study to improve the cost performance and schedule delay in the applications virtualization project and other IT projects at NBE.

5.1 Summary of Major Findings

The major purpose of the study was to identify the causes of cost overrun and schedule delay in the applications virtualization project at NBE. In addition the research aimed to assess the cost management practice and the time management practice and also identified the major causes that led to the cost overrun and schedule delay of the project and made recommendations on areas that need improvement and correction.

In this study the analysis done on general issues of project time management revealed that majority of the respondents are in agreement with that the proper planning and activity identification were not done. In addition, the project team was not involved in schedule development. The only managerial information disclosed to the team is that of technical project related aspects.

The project did not involve all the stakeholders responsible for providing inputs regarding the project time management. Thus, identifying the activities and defining them specifically, determining the sequence and relationship among the activities, assigning resources, estimating each activity duration, identifying milestones for monitoring the project success, developing a realistic and implementable time table which is based on the other activities, all these tasks were not done properly and were poorly executed. In addition to this the schedule monitoring and control practice was found to be inadequate as the there was no baseline like a realistic schedule and milestones to compare the actual progress of the project with.

This also applies to the cost management, as the project team and other stakeholders were not involved in any decisions making and providing inputs related to the cost of the project. The team has no clue on how cost is estimated, allocated and managed. In addition, expert judgment

was used to estimate the project cost, however only the project manager was involved in determining the cost; this is inappropriate for such a complex project as an individual can miss many inputs and make an uninformed decision.

There was also negligence in managing and administering the cost even though that is one of the major constraints to be controlled. Emphasis on tracking and monitoring the cost performance was not done properly which implies that there was poor cost control.

In terms of the cause of schedule delay, six major causes were identified. Namely, poor schedule management, project complexity, additional work, scope change, design related mistakes and delayed decision making process.

The major causes of cost overrun are poor cost management, complexity of the project, new technology being involved, change in scope, additional work and rework, incomplete requirements and design.

The project complexity can be attributed to the idea of virtualization being new and vague; in addition the technology involved is new as the project team had to deploy two systems on a platform initially designed to entertain one system. This has made the project more complex and created more misunderstandings among the team and management as to how to deliver the project. In order to solve these misunderstandings and also to get acquainted with the project idea required more time and money than what was originally expected.

The scope of the project has clearly changed from upgrading a single system to the concept of virtualization which is a new concept for everyone involved in the project. This change in scope has created the need for additional work and rework since the project team has incorporated a lot of activities to cope up with the change in the functions and features of the project. Thus to entertain the new requirements, the project team needed additional time, resource and undertakings which has contributed to the delay and overrun.

The other major cause identified is design related problems; the original design was incomplete and full of error since the concept of virtualization was new. The design was based on few and general inputs. The inaccuracy of the design can be attributed to the little knowledge at the time

of planning due to lack of research and detailed study. Thus to verify the original design and to make the necessary corrections the project team required extra time and cost.

Delay in decision making can be attributed to first there was delay in decision to undertake the project or not since the project was new and both management and the project team had difficulty understanding and accepting the very concept of the project. Secondly, negotiation with the vendors who supply the hardware, software and license also took time. The sustainability of the project was also in question where discussions among the project team, the project manager and the steering committee held the project back. All of these delays imply that the execution of the project froze for a while however, certain over head cost had to be incurred hence, the reason for both cost overrun and schedule delay.

5.2 Conclusion

Based on the findings and data analysis of the research, the following conclusions were drawn on the cost and time management practice and reasons behind cost overrun and schedule delay.

The project in general lacks detail planning and understanding of the very concept of the project idea. As indicated in the previous section both the way the cost is administered and determined is poor and the way the schedule is managed is ineffectual. Therefore, it can be concluded that that the time and cost management practice is poor and its one of the major factors that have led to the significantly visible delay and cost overrun.

In addition to the poor time and cost management practice the other major causes for cost overrun and schedule delay are similar. Project complexity, new technology, change to the scope of the project, additional work and rework, design related problems and delay in decision making were identified as the major causes of both schedule delay and cost overrun. All these causes are interconnected and compatible as each element contributed to the rise of the other elements. This shows that the factors that gave rise to cost overrun also contributed to the delay in time, this indicates the coexistence of the two variables.

Finally, it can be concluded that all the above mentioned problems are the inherent byproducts of poor project management as both cost and time are integral elements in project management.

5.3 Recommendation

- For effective project management using the PMI guideline will deliver effective results. Plan for all the elements in the PM BOK; scope, time, cost, risk, communication, human resource, quality, change...so that it could serve as a guideline for implementation and corrective actions.
- Use of project management tools and techniques for planning, executing and control of the project cost and time is important for effective management of the two elements.
- Involve all the stakeholders in making project related decisions regarding cost and time. The project team members, the end users, top management; anyone who affects or who is affected by the project should be involved.
- Agile project management has been effective in IT projects as change is constant in IT projects. Thus the use of agile project management which is about embracing change even late in the development stage is appropriate. It also helps to deliver the features having the real time information to tightly manage cost, time and scope.
- Make use of computerized tools such as spreadsheets and project management software that can make working with different cost estimates and cost estimation tools easier. This also applies for schedule management.
- Monitoring cost performance closely and ensuring that only appropriate project changes are included in a revised cost baseline and informing project stakeholders of authorized changes to the project that will affect costs, this helps with controlling the project cost.
- Documenting milestone deliverables and due dates and checking the progress of the project in relation to the plan and to monitor and handle changes, this helps with controlling the project time.
- Develop and maintain effective communication channels so that delay in decision can be minimized and also for effective time and cost control.
- Involving experts who have experience in this area can help with minimizing design errors and ill defined requirements. In addition this can help make the project idea more clear and understandable. This is also important for sharing knowledge.
- Providing training to the project team will also reduce misunderstandings and misconceptions which will in turn help them make decisions quickly and deliver the project on time and within budget.

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Appendix A

Addis Ababa University
College Of Business and Economics
School of Commerce
MA in Project Management
Questionnaire for Project Work

Note of Permission:

Dear Sir/Madam I respectfully ask that you help answer this questionnaire. Your response is highly valuable and contributory to the outcome of the research titled “An assessment of the causes of cost overrun and schedule delay on an IT project: The case of NBE Application Virtualization Project”. All information provided shall at utmost be kept confidentially and utilized for academic purpose only.

Thank you.

Instructions:

- Do not write your name.
- Please read the questions carefully and provide an appropriate response.
- Please tick (✓) your answers and fill spaces provided where necessary.

Contact of researcher:

Enas Mohammed

E-mail: enasmoh21@gmail.com

Phone Number: +251911940703

Section A: General Organization Information

1. Name of organization you're part of _____
2. Gender
Male Female

3. Level of education

1st degree Masters others please specify _____

2nd degree PhD

4. Job title _____

5. Relevant working experience (Years):

1-3 Yrs 5-10 Yrs

3-5 Yrs >10Yrs

6. Which of the cost estimation technique was used

Rough order of magnitude Budgetary estimate

Definitive estimates others please specify _____

Please use a tick (√) mark to answer the following statements as SA=(Strongly Agree).
A=(Agree), N=(Neutral), D=(Disagree) and SD=(Strongly Disagree) to rate the factors

Schedule Management Related Questions		SA	A	N	D	SD
1	Schedule activities were specifically identified and enough time was assigned for each activity					
2	Enough resource was assigned for to each activity a team member performs					
3	Realistic time was imposed for the project					
4	The project team didn't have any difficulty meeting deadlines					
5	Top management ensured the proper completion of each milestone through strict supervision					
6	Project team members received proper guidance and support from superiors to avoid any time delays					
7	The project manager ensured the deadlines were met and changes to the original schedule were handled efficiently					

Causes of Schedule Delay		SA	A	N	D	SD
1	The project is complex and large					
2	Delay in approval of different activities due to excessive approval procedures					
3	Delay in the earlier phases (i.e. pre planning and design phase)					
4	Delay in procurement of materials					
5	Error in original design					
6	Additional work to mitigate problems that arise during the implementation phase					
7	Changes to project scope and emerging new requirements					
8	Delay in decision making (choosing consultants, project team members...)					
9	Incomplete design (inadequate or lacks detail and definition, badly developed, incomplete, or incorrect)					
10	Inappropriate and ill defined project requirements					
11	Poor resource distribution among the project activities					

Cost Management Related Questions		SA	A	N	D	SD
1	A realistic cost estimation was developed for the project					
2	The estimated cost was allocated to individual work items effectively					
3	There is a contingency plan					
4	The project manager closely monitored the cost performance of the project					
5	Variation to the project cost were managed properly					

Causes of Cost Overrun		SA	A	N	D	SD
1	The project is complex and large					
2	New technology is involved					
3	Risks were not planned for and improperly managed					
4	Delay between design and procurement phases					
5	Unclear, unstable and incomplete requirement statement and inappropriately assigned cost for it					
6	Rework and additional work					
7	Change to project scope					
8	Inadequate monitoring of funds					
9	Poorly administered cost					
10	Design error					
11	Inaccurate estimates					

Any other factor that may have contributed to the cost overrun please specify

Any other factor that may have contributed to schedule delay please specify

Last comments, suggestions regarding time and cost overrun and their management

Appendix B

Addis Ababa University
College Of Business and Economics
School of Commerce
MA in Project Management

Dear respondent,

This interview questions is prepared to undertake a project work titled: “An assessment of the causes of cost overrun and schedule delay on an IT project: The case of NBE Application Virtualization Project”. The purpose of the paper is to gather data for partial fulfillment of a masters degree in Project Management. Therefore, the information you provide will only be used for academic purpose and it will be kept confidential.

1. How was the project planned overall? Who was involved?
2. How was the cost of the project determined? Can you explain the process please?
3. What were the things considered when you determined the project schedule?
4. How was the requirement for the project determined?
5. How efficiently was resources (manpower, money, material...) distributed for the project?
6. How do you communicate the progress of the project?
7. How do you solve the discrepancies and variances that arise during the project?
8. How was risk managed? What strategies are used to tackle problems as they arise?
9. How often do you supervise and monitor the work of the project team?
10. How is change managed?
11. Is the staff fully equipped with the necessary knowledge, skill and equipment to undertake this project?
12. What techniques do you use to control cost and time?
13. What are the causes for delay in schedule?
14. What are the causes for cost overrun?
15. How do you tackle these two problems?